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#### **Citation for published version:**

Cram, L, Moore, A, Skewes, J, Roepstorff, A, Prkachin, K & Roberts, N 2015, 'Implicit indicators of national identity modulate brain activation when processing empathy for in-group and out-group members in pain', BNA 2015 Festival of Neuroscience, Edinburgh, United Kingdom, 12/04/15 - 15/04/15 pp. 671-672.  
<<http://www.bna.org.uk/static/docs/BNA2015/BNA2015-Abstract-Book.pdf>>

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Poster Ref: P3-D-031

Theme: D: Learning, Memory and Cognition

**Implicit indicators of national identity modulate brain activation when processing empathy for in-group and out-group members in pain.**

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We use functional magnetic resonance imaging (fMRI) to investigate the effects of overt and covert nationality cues on empathy for the pain of others. 27 healthy participants from Scotland completed an fMRI scan, Empathy Quotient (EQ) questionnaire and a questionnaire to quantify attachment to Scotland (national attachment). During the fMRI sequence, participants viewed videos of people experiencing shoulder pain and rated pain intensity and unpleasantness. Each video showed someone of the same (Scottish) or different (English) nationality. Videos were previously classified as either high or low pain. In addition, half of the trials were preceded by an implicit prime of the Scottish flag. High vs low pain videos resulted in greater activation in right insula ( $p < 0.001$ ), right cerebellum ( $p < 0.001$ ), left superior frontal gyrus (SFG) ( $p = 0.001$ ) and left inferior frontal gyrus ( $p = 0.003$ ) when controlling for empathy and national attachment. EQ score positively correlated with activation in the precuneus ( $p < 0.001$ ) in response to high pain vs low pain videos. Videos showing people of the same nationality (Scottish) that included the flag prime elicited greater haemodynamic response in right SFG ( $p < 0.001$ ) than videos showing the same nationality without a flag prime, controlling for empathy and attachment. Increased activation was found in right anterior cingulate cortex (ACC) ( $p = 0.012$ ) with small volume correction (SVC). EQ score correlated positively with activation in fusiform gyrus ( $p < 0.001$ ) within the contrast of same nationality with flag vs without flag. There was a positive correlation between attachment and activation in posterior cingulate cortex ( $p = 0.005$ ), when viewing people of a different nationality (English) with no flag prime compared to when a national flag prime was present. There was no significant difference in activation between viewing videos of people of either explicit nationality, in the absence of the national flag prime. The presence of a national flag, even when presented implicitly, has an effect on the way in which we process empathy for others in pain. So the judgments that we make about others may be modulated without our conscious knowledge. This has implications for clinical practice and in political and policy-making settings.

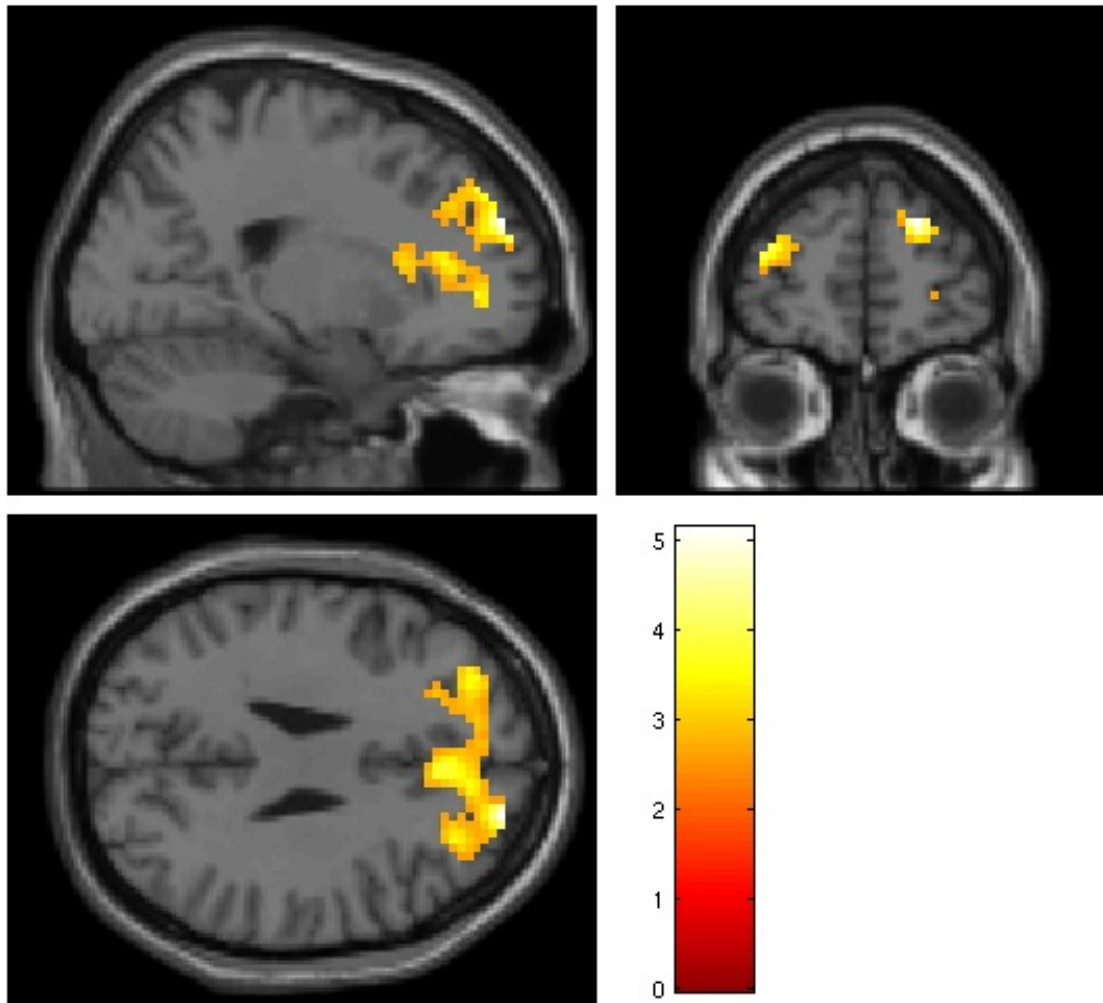


Figure 1. Controlling for EQ and attachment scores, peak activity is found in the right SFG when exposed to the flag prime versus no prime when viewing someone of the 'same' nationality (Scottish). After small volume correction, activity is also seen in the right ACC.